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10/577,678

04/28/2006

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EXAMINER

WALCK, BRIAN D

ART UNIT

PAPER NUMBER

1793

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|--|--|
| Office Action Summary | Application No. 10/577,678 | Applicant(s) LEHTINEN ET AL. | |
| | Examiner Brian Walck | Art Unit 1793 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 February 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 29-54 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 29-54 is/are rejected.
- 7) ☒ Claim(s) 41-47 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

1. Claims 1-28 are canceled. Claims 29-54 are newly added. Claims 29-54 are pending.

Claim Objections

2. Claims 41-47 are objected to because of the following informalities: claims 41-47 refer to cuprous oxide alternatively as "cuprous oxide," "copper (I) oxide," "Cu₂O," and "Cu₂O." Cuprous oxide should be referred to consistently as one term (either cuprous oxide, copper (I) oxide, or Cu₂O) for the sake of consistency. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. **Claims 30 and 33-36 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.** The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 30 recites the limitation "dilute copper-free zinc sulphate solution." The limitation "dilute" is new matter which was not described in the original disclosure.

Claims 33-36 also contain new matter due to being dependent on claim 30.

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5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

- 6. Claims 29-44 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

Claim 29 recites the limitation "the functional group." There is insufficient antecedent basis for this limitation in the claim. Claims 30-44 are indefinite for being dependent on indefinite claim 29.

Additionally, the term "dilute" in claim 30 is a relative term which renders the claim indefinite. The term "dilute" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. This renders the concentration of the copper-free zinc sulphate solution indefinite, which renders the scope of instant claim 30 indefinite. The scope of instant claims 33-36 is indefinite as well because claims 33-36 are dependent on instant claim 30.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 29, 31, 32, 37, 37, 38, 40, and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,355,009 to Stewart (cited in prior office action) in view of the article titled "Selective extraction of copper from acidic zinc sulfate leach solution using LIX 622" by George Owusu (hereinafter referred to as Owusu) and US 5,190,660 to Lindoy et al (hereinafter referred to as Lindoy).

Regarding claim 29, Stewart discloses a method for the removal of copper from a concentrated chloride-containing zinc sulphate solution known as raw solution that is going to an electrolytic preparation of zinc, comprising routing at least some of the raw

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solution to a copper removal wherein the copper removal takes place using zinc cementation, and routing the solution from which the copper has been removed to a subsequent stage of solution purification (Stewart, abstract).

Stewart does not disclose that the copper removal takes place using a chelating alkyl silylated silica-based ion exchanger, of which the functional group is a polymeric amine.

Owusu discloses that besides the zinc dust cementation process, other methods such as ion exchange could be considered for the removal of copper from a zinc sulphate solution (Owusu, Introduction, pages 1-2).

Lindoy discloses a chelating alkyl-silylated silica-based ion exchanger, of which the functional group is polyethyleneimine, i.e. a polymeric amine (Lindoy, column 5, line 55- column 6 line 4) useful for removing copper in commercial applications (Lindoy, column 8, lines 3-5). Lindoy also discloses that the ion exchanger is most selective toward copper, and is selective for copper over zinc (Lindoy, column 8, lines 32-43).

Regarding claim 29, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the copper removal by zinc cementation step in the process of Stewart with the copper removal by chelating alkyl-silylated silica-based ion exchanger of Lindoy as suggested by Owusu. The motivation for doing so is that Owusu teaches that ion exchange and zinc cementation are substitutable equivalents known for the same purpose of removing copper from a zinc sulphate solution and substitution of one known element for another yields predictable results to one of ordinary skill in the art (see MPEP 2144.06 and 2143 B).

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Regarding claim 31, Stewart discloses that "300 grams of the white dust sample material were leached in 1 liter of sulfuric acid solution" (Stewart, column 3, lines 7-9) wherein the white dust contains 52% zinc oxide (Stewart, column 2, line 38) and 95% of the zinc was dissolved (Stewart, column 3, line 13). This means that the zinc concentration of the raw solution would be about 119 g/l, which is within the instantly claimed range of 30-200 g/l.

Regarding claim 32, Lindoy discloses that the copper content added to the ion exchanger can be from 0.0005 to 0.3 mol/liter (Lindoy, column 7, lines 41-42), or about 32 - 19,100 mg/L, which overlaps the instantly claimed range of 100-2000 mg/L. In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists (see MPEP 2144.05 [R-5]). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected values for copper concentration that lie within the instantly claimed ranges because Stewart in view of Owusu and Lindoy discloses the same utility throughout the disclosed ranges.

Regarding claim 37, Lindoy discloses that the polymeric amine acting as the functional group of the ion exchanger is a polyethylene imine (Lindoy, column 5, line 55-column 6 line 4).

Regarding claim 38, Stewart discloses that before copper removal at least some of the raw solution is routed to a chloride removal stage (Stewart, abstract).

Regarding claim 40, Stewart discloses that the leach solution had “a final pH of about 2” (Stewart, column 3, line 12) before chloride removal, which is within the instantly claimed range of 1.5-3.9.

Regarding claim 44, Stewart discloses that “it is preferred that the residual cupric concentration [after chloride removal and before copper removal] be at least about 0.5 g/l, more preferably about 0.5-5.0 g/l” (Stewart, column 3, lines 38-39), which is the same as the instantly claimed range of 500-5000 mg/l.

11. Claims 30, 33, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stewart in view of Owusu and Lindoy as applied to claims 29, 31, 32, 37, 37, 38, 40, and 44 above, and further in view of DD 9604 to Wolf et al (hereinafter referred to as Wolf; cited in prior office action; an English translation has been included in this office action and has been relied upon for examination purposes).

Regarding claim 30, Lindoy further discloses that the ion exchange stage comprises a pretreatment comprising washing with NaHCO_3 (Lindoy, column 7, lines 30-31), i.e. an alkaline pretreatment, the copper removal, regeneration of the ion exchanger and separation of copper from the regeneration solution (Lindoy, column 6, lines 11-63).

Neither Lindoy nor Owusu nor Stewart disclose treatment with dilute copper-free zinc sulphate solution.

Wolf discloses a process of removing heavy metals such as iron and chromium from a zinc sulfate solution using an ion exchanger, wherein the ion exchanger is first

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loaded with the ions to purified, i.e. zinc ions, by washing with ions of the element to be purified, i.e. zinc sulfate solution, in order to charge the ion exchanger with zinc ions so that during ion exchange zinc passes into the solution to be purified and the metal to be removed becomes bonded to the ion exchanger (Wolf, English translation, last paragraph of page 3 - second paragraph of page 4). Wolf discloses that this is done so that the resulting solution is free from contaminating fractions of salts, i.e. ions (Wolf, English translation, second to last paragraph of page 3) such as acids and bases. Since the treatment is done so that contaminants do not appear in the resultant stream, one of ordinary skill in the art would infer that the zinc sulfate on Wolf is relatively uncontaminated and thus copper-free.

Regarding claim 30, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Stewart in view of Owusu and Lindoy such that the ion exchanger is pre-treated with copper-free zinc sulphate solution as taught by Wolf. The motivation for doing so would be to keep the resulting zinc sulphate free from contaminants. Although Wolf does not explicitly that the zinc sulphate solution is dilute, one of ordinary skill in the art would appreciate that a dilute solution of zinc sulphate could be used so long as it attained sufficient loading of the ion exchanger with zinc.

Regarding claim 33, Wolf does not disclose adding any acids to the zinc-sulphate solution, so it is expected that the zinc sulphate solution of Wolf has a pH of at least 2.

Regarding claim 36, Lindoy discloses that the copper separation from the ion exchange can be carried out by precipitation by the addition of anions that form a

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precipitate with the removed ion (Lindoy, column 6, lines 49-52), i.e. sulphide precipitation.

12. Claims 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stewart in view of Owusu, Lindoy, and Wolf as applied to claims 30, 33, and 36 above, and further in view of US 5,182,026 to Pike.

Regarding claims 34 and 35, neither Stewart nor Owusu nor Lindoy nor Wolf explicitly disclose that the copper removal with ion exchange occurs at a pH of over 3.5 or the narrower range of 3.7-4.2.

Pike discloses chelating-exchange resins wherein the functional groups are amines (Pike, column 2, lines 45-56) useful for recovering heavy metal ions, preferably copper from liquids such as mine leachate solutions, wherein the liquid suitably has a pH of from about 1 to about 5 (Pike, column 9, line 67 – column 10, line 8), which overlaps the instantly claimed pH ranges.

Regarding claims 34 and 35, it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the ion exchange step of Stewart in view of Owusu, Lindoy, and Wolf in the pH range disclosed in Pike. The motivation for doing so is that Pike discloses a similar ion exchanger used for a similar purpose and one of ordinary skill in the art would recognize that the pH range suitable for Pike would likely be suitable for Stewart in view of Owusu, Lindoy, and Wolf as well.

In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists (see MPEP 2144.05 [R-5]). It would have been obvious to one of ordinary skill in the art at the time the invention was

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made to have selected values for pH that lie within the instantly claimed ranges because Stewart in view of Owusu, Lindoy, and Wolf and further in view of Pike discloses the same utility throughout the disclosed ranges.

13. Claims 39 and 41-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stewart in view of Owusu and Lindoy as applied to claims 29, 31, 32, 37, 37, 38, 40, and 44 above, and further in view of US 4,005,174 to Bodson (cited in prior office action).

Neither Stewart nor Owusu nor Lindoy disclose the limitations of instant claims 39 and 41-43.

Regarding claims 41 and 42, Bodson discloses a process for removing chloride from a solution of zinc sulfate (Bodson, abstract) wherein chloride removal is performed using cuprous oxide so that the chloride in the solution is precipitated as copper chloride and the copper chloride is separated from the solution and converted with alkali back to cuprous oxide, which is at least partially routed back to chloride removal (Bodson, figure 1).

Regarding claims 41 and 42, it would be obvious to one of ordinary skill in the art at the time the invention was made to substitute the chloride removal process of Stewart in view of Owusu and Lindoy with the chloride removal process of Bodson. The motivation for doing so would be that it would result in a more economical process than the process taught by Stewart in view of Owusu and Lindoy due to the recycling of the cuprous oxide used to remove the chloride.

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Regarding claim 39, Bodson discloses that the chloride removal occurs at a temperature of 40 °C (Bodson, column 5, line 49)

Regarding claim 43, part of the raw solution of Bodson is routed to cuprous oxide precipitation, where the copper in the solution is made to react with zinc powder to form cuprous oxide (referring to Bodson figure 1, the solution first passes through acid lixiviation and residue separation, then removal of chlorine where the copper reacts with zinc powder) and the cuprous oxide generated is routed to the chloride removal stage (Bodson, figure 1).

14. Claims 45-50 and 53-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stewart in view of Owusu, Lindoy, and Wolf as applied to claims 30, 33, and 36 above, and further in view of Bodson.

Instant claim 45 is a composite of the limitations of instant claims 29, 30, 38, 39, and 40. The further limitations of instant claims 46-50 and 53-54 are the same as the limitations of instant claims 42, 43, 31, 44, 33, 36, and 37, respectively. See the reasoning listed above for instant claims 29-33 and 39-43 for why instant claims 45-50 and 53-54 are unpatentable over Stewart in view of Owusu, Lindoy, Wolf, and Bodson

15. Claims 51 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stewart in view of Owusu, Lindoy, Wolf, and Bodson as applied to claims 45-50 and 53-54 above, and further in view of Pike.

The further limitations of instant claims 51 and 52 are the same as the limitations of instant claims 34-35. See the reasoning listed above for instant claims 34-35 for why

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instant claims 51 and 52 are unpatentable over Stewart in view of Owusu, Lindoy, Wolf, Bodson, and Pike.

Response to Arguments

16. Applicant's arguments with respect to now cancelled claims 1-28 have been considered but are moot in view of the new ground(s) of rejection. However, arguments regarding prior art that are applicable to the new grounds of rejection will be addressed.

Applicant argues that the ion exchanger disclosed by Wolf works differently from the ion exchanger used in the present claimed subject matter since the ion exchanger of Wolf is washed with acid, and Wolf does not teach that when the impurity metal is copper then the exchanger should be alkaline treated. This is not found persuasive because both the ion exchanger of Wolf and the instantly claimed subject matter work by cation exchange. Although Wolf does not disclose an alkaline pretreatment, Lindoy does (see 103 rejection above). The important teaching of Wolf is that in a cation exchanger, the exchanger should be pre-loaded with the solution to be purified so that contaminating ions are not let into solution during ion exchange.

Applicant argues that the ion exchanger of Wolf is unrelated to the current invention because it is used to remove iron and chromium from a zinc sulfate solution instead of copper. This is not found persuasive because although the example Wolf provides is removing iron and chromium from a zinc sulfate solution, copper should be selective toward the same ion exchangers as iron and chromium because as applicant points out, Fischer page 3130, last paragraph, lines 2-3, states that "iron can interfere

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with selectivity and reduce the purity of extracts containing the more valuable metals.”

Fe interferes with the selectivity of other metals because it bonds to the same types of ion exchanges that more valuable metals, such as copper, bond to.

Applicant argues that the zinc sulfate solution in the pretreatment of Wolf is not uncontaminated. This is not found persuasive because the treatment of Wolf is done so that contaminants do not appear in the resultant stream, so it can be inferred that pretreatment would be done using an uncontaminated solution.

Applicant argues that Bodson does not teach that a part of the raw solution is fed to a separate cuprous oxide precipitation stage where copper in the solution reacts with zinc powder to form cuprous oxide that is routed to the chloride removal stage. This is not found persuasive because Bodson teaches that the part of the raw solution is fed to the removal of chlorine along with zinc powder, then decanted, filtered, washed, and reacted with NaOH to form cuprous oxide which is routed to the chloride removal stage (Bodson, figure 1).

Conclusion

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian Walck whose telephone number is (571)270-5905. The examiner can normally be reached on Monday-Friday 9 AM-6:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571)272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/
Supervisory Patent Examiner, Art
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